

REMARKS

By the present Amendment, claims 1-10 are cancelled and claims 11-24 are added. This leaves claims 11-24 pending in the application, with claims 11 and 20 being independent.

Substitute Specification

The specification is revised to eliminate grammatical and idiomatic errors in the originally presented specification. The number and nature of the changes made in the specification would render it difficult to consider the case and to arrange the papers for printing or copying. Thus, the substitute specification will facilitate processing of the application. The substitute specification includes no "new matter". Pursuant to M.P.E.P. § 608.01(q), voluntarily filed, substitute specifications under these circumstances should normally be accepted. A marked-up copy of the original specification is appended hereto.

Rejections Under 35 U.S.C § 112, Second Paragraph

Original claims 9 and 10 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. By the present Amendment, the originally filed claims have been rewritten to avoid the language alleged to be indefinite in the Office Action. All language of the presently pending claims is now believed to be definite and provided with proper antecedent basis.

Thus, the pending claims are definite and comply with 35 U.S.C. § 112.

Rejections Under 35 U.S.C. § 102 and § 103

Claim 11 covers a piston accumulator having an accumulator housing 4, a piston 3, a magnet arrangement, and magnet field sensor. The accumulator housing forms a cylindrical tube 1 of magnetizeable material, defines an axial direction along a longitudinal axis 5, and has a gas

space 7 and a hydraulic fluid space 9. The piston is axially moveable along a stroke path in the cylindrical tube, and forms a moveable separating element separating spaces 7 and 9 in the housing. Additionally, the piston has radially smaller and larger circumferential sections 21 and 23 spaced from and engaging the longitudinal tube, respectively, and has a radially extending shoulder surface extending between the smaller and larger circumferential sections. The magnet arrangement is mounted on the smaller circumferential section of the piston and generates a field on the cylindrical tube. The magnet arrangement includes first and second annular rings 29 and 31 of magnetizeable material and a plurality of magnet elements 35 with pole end surfaces between and abutting the annular rings. The second annular ring is supported by the shoulder surface of the piston in a direction of the hydraulic fluid space. The magnet field sensor is positioned on an exterior of the cylindrical tube and includes a first Hall sensor generating signals representative of piston positions along the stroke path in response to the field generated by the magnet elements.

By forming the piston accumulator in this manner, a simple and effective structure is provided for monitoring the piston position.

Claim 1 stands rejected under 35 U.S.C. § 102 as being anticipated by DE 195 39 551 without comments. This patent is distinguishable by the additional limitations in claim 11, particularly those from original claims 5 and 17.

Claims 1-4, 9 and 10 stand rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 6,346,806 to Schabuble. The recited accumulator is alleged to be merely an intended use, and thus, is not given patentable weight. Such rejection is believed to be avoided by reciting such accumulator structure as the gas space and the hydraulic fluid space to distinguish this cited patent.

Claims 5 and 6 stand rejected under 35 U.S.C. § 103 as being unpatentable over the Schabuble patent in view of Japanese Patent No. 11-132204 (cited in the IDS). The Schabuble patent is cited as a piston-type device having a piston 4, 22 of non-magnetizable material moveable in a cylindrical tube 1 of magnetizable material. A plurality of permanent magnets 23 (Fig. 6) are allegedly mounted at a radial distance from the circumference of the piston, in a row, concentric with the longitudinal axis of the piston, with the same polarity for the polar axis to extend parallel to the longitudinal axis. Two Hall effect sensors 21 and 21' (Fig. 5) are allegedly positioned on the exterior of the cylindrical tube and allegedly respond to the field generated by the magnets to determine piston position. The magnets are allegedly adjacent a ring element 5 of magnetizable material adjoining one polar end surface of the magnets. The ring element on the exterior allegedly forms a spacing from the tube, and has an exterior diameter approximately the interior diameter of the tube remote from the magnets. The Japanese patent is cited for a piston-type device having a piston 12, a cylindrical tube 11, a plurality of magnets 41a where the magnets are allegedly adjacent a ring element 42 of magnetizable material and a second ring element 43 of magnetizable material. In support of the rejection, it is contended that it would be obvious to provide first and second ring elements on the Schabuble device, as allegedly taught in the Japanese patent.

Relative to the Schabuble and Japanese patents, neither discloses a piston-type accumulator having a gas space and a hydraulic fluid space separated by a piston. Thus, claim 11 is patentably distinguishable by the specific recitation of those two spaces to provide a piston accumulator.

Additionally, claim 7 is distinguished by a piston having a smaller circumferential section on which the magnet arrangement is arranged and a larger circumferential section which engages

the housing cylindrical tube with a shoulder surface between those two circumferential segments to support the magnet arrangement in the direction of the hydraulic fluid space. Such support of the magnetic arrangement on the piston accumulator is not disclosed or suggested by the Schabuble or Japanese patents or any of the other cited patents.

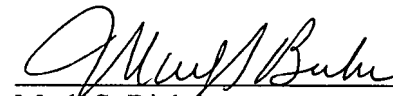
Thus, claim 11 is patentably distinguishable over the cited patents.

Claims 12-18 being dependent upon claim 11, are also allowable for the above reasons. Moreover, these dependent claims recite additional features further distinguishing them over the cited patents. Specifically, the second sensor of claim 20, the permanent magnets and their arrangement of claim 13, the permanent magnets being arranged as recited in claim 14, the configuration of the annular rings of claim 15, the threaded ring of claim 16, the axial positions of the Hall sensors of claim 17, the positioning at the end positions of the stroke path of claim 18, and the sealing element of claim 19 are not anticipated or rendered obvious, particularly within the overall claimed combination.

Claim 20 includes the limitations of original claims 1 and 3-7. Since this claim is indicated as being allowable, the record will not be burdened with further comments on claim 19 or claims 20-23 that are dependent thereon relative to the cited patents.

In view of the foregoing, claims 11-23 are allowable. Prompt and favorable action is solicited.

Respectfully submitted,


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